

Nuclear Regulatory Commission

Ammonia-hydrogen exchange towers greater than or equal to 35 m (114.3 ft) in height with diameters of 1.5 m (4.9 ft) to 2.5 m (8.2 ft) capable of operating at pressures greater than 15 MPa (2225 psi). The towers have at least one flanged, axial opening of the same diameter as the cylindrical part through which the tower internals can be inserted or withdrawn.

(iv) Tower Internals and Stage Pumps Used in the Ammonia-hydrogen Exchange Process.

Tower internals include especially designed stage contactors which promote intimate gas/liquid contact. Stage pumps include especially designed submersible pumps for circulation of liquid ammonia within a contacting stage internal to the stage towers.

(v) Ammonia Crackers Utilizing the Ammonia-hydrogen Exchange Process.

Ammonia crackers with operating pressures greater than or equal to 3 MPa (450 psi).

(vi) Infrared Absorption Analyzers

Infrared absorption analyzers capable of "on-line" hydrogen/deuterium ratio analysis where deuterium concentrations are equal to or greater than 90 percent.

(vii) Catalytic Burners Used in the Ammonia-hydrogen Exchange Process.

Catalytic burners for the conversion of enriched deuterium gas into heavy water.

(viii) Complete Heavy Water Upgrade Systems or Columns.

Complete heavy water upgrade systems or columns especially designed or prepared for the upgrade of heavy water to reactor-grade deuterium concentration. These systems, which usually employ water distillation to separate heavy water from light water, are especially designed or prepared to produce reactor-grade heavy water (*i.e.*, typically 99.75% deuterium oxide) from heavy water feedstock of lesser concentration.

[58 FR 13005, Mar. 9, 1993. Redesignated at 61 FR 35603, July 8, 1996; 65 FR 70292, Nov. 22, 2000]

APPENDIX L TO PART 110—ILLUSTRATIVE LIST OF BYPRODUCT MATERIALS UNDER NRC EXPORT/IMPORT LICENSING AUTHORITY^a

Actinium 225 (Ac 225)	Americium 242 (Am 242)
Actinium 227 (Ac 227)	Americium 243 (Am 243)
Actinium 228 (Ac 228)	Antimony 124 (Sb 124)
Americium 241 (Am 241)	Antimony 125 (Sb 125)
Americium 242m (Am 242m)	Antimony 126 (Sb 126)
	Arsenic 73 (As 73)

^a Any accelerator-produced material produced, extracted, or converted for use for a commercial, medical, or research activity.

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Arsenic 74 (As 74)	Einsteinium 254 (Es 254)
Arsenic 76 (As 76)	Einsteinium 255 (Es 255)
Arsenic 77 (As 77)	Erbium 169 (Er 169)
Barium 131 (Ba 131)	Erbium 171 (Er 171)
Barium 133 (Ba 133)	Europium 152 (Eu 152)
Barium 140 (Ba 140)	Europium 152 9.2 h (Eu 152 9.2 h)
Bismuth 207 (Bi 207)	Cadmium 109 (Cd 109)
Bismuth 210 (Bi 210)	Cadmium 113 (Cd 113)
Bromine 82 (Br 82)	Cadmium 115m (Cd 115m)
Cadmium 109 (Cd 109)	Cadmium 115 (Cd 115)
Cadmium 113 (Cd 113)	Calcium 45 (Ca 45)
Cadmium 115m (Cd 115m)	Calcium 47 (Ca 47)
Cadmium 115 (Cd 115)	Californium 248 (Cf 248)
Cadmium 113 (Cd 113)	Californium 249 (Cf 249)
Cadmium 115 (Cd 115)	Californium 250 (Cf 250)
Cadmium 113 (Cd 113)	Californium 251 (Cf 251)
Cadmium 115 (Cd 115)	Californium 252 (Cf 252)
Cadmium 113 (Cd 113)	Californium 253 (Cf 253)
Cadmium 115 (Cd 115)	Californium 254 (Cf 254)
Cadmium 113 (Cd 113)	Carbon 11 (C 11)
Cadmium 115 (Cd 115)	Carbon 14 (C 14)
Cerium 141 (Ce 141)	Cerium 141 (Ce 141)
Cerium 143 (Ce 143)	Cerium 144 (Ce 144)
Cerium 144 (Ce 144)	Cesium 129 (Cs 129)
Cerium 144 (Ce 144)	Cesium 131 (Cs 131)
Cerium 144 (Ce 144)	Cesium 134m (Cs 134m)
Cerium 144 (Ce 144)	Cesium 134 (Cs 134)
Cerium 144 (Ce 144)	Cesium 135 (Cs 135)
Cerium 144 (Ce 144)	Cesium 136 (Cs 136)
Cerium 144 (Ce 144)	Cesium 137 (Cs 137)
Cerium 144 (Ce 144)	Chlorine 36 (Cl 36)
Cerium 144 (Ce 144)	Chlorine 38 (Cl 38)
Cerium 144 (Ce 144)	Chromium 51 (Cr 51)
Cerium 144 (Ce 144)	Cobalt 57 (Co 57)
Cerium 144 (Ce 144)	Cobalt 58m (Co 58m)
Cerium 144 (Ce 144)	Cobalt 58 (Co 58)
Cerium 144 (Ce 144)	Cobalt 60 (Co 60)
Cerium 144 (Ce 144)	Copper 64 (Cu 64)
Cerium 144 (Ce 144)	Curium 240 (Cm 240)
Cerium 144 (Ce 144)	Curium 241 (Cm 241)
Cerium 144 (Ce 144)	Curium 242 (Cm 242)
Cerium 144 (Ce 144)	Curium 243 (Cm 243)
Cerium 144 (Ce 144)	Curium 244 (Cm 244)
Cerium 144 (Ce 144)	Curium 245 (Cm 245)
Cerium 144 (Ce 144)	Curium 247 (Cm 247)
Cerium 144 (Ce 144)	Dysprosium 165 (Dy 165)
Cerium 144 (Ce 144)	Dysprosium 166 (Dy 166)
Cerium 144 (Ce 144)	Einsteinium 252 (Es 252)
Cerium 144 (Ce 144)	Einsteinium 253 (Es 253)
	Einsteinium 254 (Es 254)
	Einsteinium 255 (Es 255)
	Erbium 169 (Er 169)
	Erbium 171 (Er 171)
	Europium 152 (Eu 152)
	Europium 152 9.2 h (Eu 152 9.2 h)
	Gadolinium 148 (Gd 148)
	Gadolinium 153 (Gd 153)
	Gadolinium 159 (Gd 159)
	Gallium 67 (Ga 67)
	Gallium 72 (Ga 72)
	Germanium 68 (Ge 68)
	Germanium 71 (Ge 71)
	Gold 195 (Au 195)
	Gold 198 (Au 198)
	Gold 199 (Au 199)
	Hafnium 172 (Hf 172)
	Hafnium 181 (Hf 181)
	Holmium 166m (Ho 166m)
	Holmium 166 (Ho 166)
	Hydrogen 3 (H 3)
	Indium 111 (In 111)
	Indium 113m (In 113m)
	Indium 114m (In 114m)
	Indium 115m (In 115m)
	Indium 115 (In 115)
	Iodine 123 (I 123)
	Iodine 125 (I 125)
	Iodine 126 (I 126)
	Iodine 129 (I 129)
	Iodine 131 (I 131)
	Iodine 132 (I 132)
	Iodine 133 (I 133)
	Iodine 134 (I 134)
	Iodine 135 (I 135)
	Iridium 192 (Ir 192)
	Iridium 194 (Ir 194)
	Iron 52 (Fe 52)
	Iron 55 (Fe 55)
	Iron 59 (Fe 59)
	Krypton 85 (Kr 85)
	Krypton 87 (Kr 87)
	Lanthanum 140 (La 140)
	Lead 210 (Pb 210)
	Lutetium 177 (Lu 177)
	Manganese 52 (Mn 52)
	Manganese 54 (Mn 54)
	Manganese 56 (Mn 56)

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Mendelevium 258 (Md 258)	Platinum 197m (Pt 197m)	Scandium 48 (Sc 48)	Thallium 200 (Tl 200)
Mercury 197m (Hg 197m)	Platinum 197 (Pt 197)	Selenium 75 (Se 75)	Thallium 201 (Tl 201)
Mercury 197 (Hg 197)	Polonium 208 (Po 208)	Silicon 31 (Si 31)	Thallium 202 (Tl 202)
Mercury 203 (Hg 203)	Polonium 209 (Po 209)	Silver 105 (Ag 105)	Thallium 204 (Tl 204)
Molybdenum 99 (Mo 99)	Polonium 210 (Po 210)	Silver 110m (Ag 110m)	Thulium 170 (Tm 170)
Neodymium 147 (Nd 147)	Potassium 42 (K 42)	Silver 111 (Ag 111)	Thulium 171 (Tm 171)
Neodymium 149 (Nd 149)	Potassium 43 (K 43)	Sodium 22 (Na 22)	Tin 113 (Sn 113)
Neptunium 235 (Np 235)	Praseodymium 142 (Pr 142)	Sodium 24 (Na 24)	Tin 123 (Sn 123)
Neptunium 237 (Np 237)	Praseodymium 143 (Pr 143)	Strontium 85 (Sr 85)	Tin 125 (Sn 125)
Nickel 59 (Ni 59)	Promethium 145 (Pm 145)	Strontium 89 (Sr 89)	Tin 126 (Sn 126)
Nickel 63 (Ni 63)	Promethium 147 (Pm 147)	Strontium 90 (Sr 90)	Titanium 44 (Ti 44)
Nickel 65 (Ni 65)	Promethium 149 (Pm 149)	Strontium 91 (Sr 91)	Tritium (H3)
Niobium 93m (Nb 93m)	Radium 223 (Ra 223)	Strontium 92 (Sr 92)	Tungsten 181 (W 181)
Niobium 94 (Nb 94)	Radium 226 (Ra 226) ^b	Sulphur 35 (S 35)	Tungsten 185 (W 185)
Niobium 95 (Nb 95)	Rhenium 186 (Re 186)	Tantalum 182 (Ta 182)	Tungsten 187 (W 187)
Niobium 97 (Nb 97)	Rhenium 188 (Re 188)	Technetium 96 (Tc 96)	Vanadium 48 (V 48)
Nitrogen 13 (N 13)	Rhodium 103m (Rh 103m)	Technetium 97m (Tc 97m)	Xenon 131m (Xe 131m)
Osmium 185 (Os 185)	Rhodium 105 (Rh 105)	Technetium 97 (Tc 97)	Xenon 133 (Xe 133)
Osmium 191m (Os 191m)	Rubidium 81 (Rb 81)	Technetium 99m (Tc 99m)	Xenon 135 (Xe 135)
Osmium 191 (Os 191)	Rubidium 86 (Rb 86)	Technetium 99 (Tc 99)	Ytterbium 175 (Yb 175)
Osmium 193 (Os 193)	Rubidium 87 (Rb 87)	Tellurium 125m (Te 125m)	Yttrium 87 (Y 87)
Oxygen 15 (O 15)	Ruthenium 97 (Ru 97)	Tellurium 127m (Te 127m)	Yttrium 88 (Y 88)
Palladium 103 (Pd 103)	Ruthenium 103 (Ru 103)	Tellurium 127 (Te 127)	Yttrium 90 (Y 90)
Palladium 109 (Pd 109)	Ruthenium 105 (Ru 105)	Tellurium 129m (Te 129m)	Yttrium 91 (Y 91)
Phosphorus 32 (P 32)	Samarium 151 (Sm 151)	Tellurium 129 (Te 129)	Yttrium 92 (Y 92)
Phosphorus 33 (P 33)	Samarium 153 (Sm 153)	Tellurium 131m (Te 131m)	Yttrium 93 (Y 93)
Platinum 191 (Pt 191)	Scandium 46 (Sc 46)	Tellurium 132 (Te 132)	Zinc 65 (Zn 65)
Platinum 193m (Pt 193m)	Scandium 47 (Sc 47)	Terbium 160 (Tb 160)	Zinc 69m (Zn 69m)
Platinum 193 (Pt 193)			Zinc 69 (Zn 69)
			Zirconium 93 (Zr 93)
			Zirconium 95 (Zr 95)
			Zirconium 97 (Zr 97)

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APPENDIX M TO PART 110—CATEGORIZATION OF NUCLEAR MATERIAL^d

[From IAEA INFCIRC/225, Rev. 1]

Material	Form	Category		
		I	II	III ^e
1. Plutonium ^a	Unirradiated ^b	2 kg or more	Less than 2 kg but more than 500 g.	500 g or less.
2. Uranium-235 ^c	Unirradiated ^b : Uranium enriched to 20 pct U ²³⁵ or more. Uranium enriched to 10 pct U ²³⁵ but less than 20 pct. Uranium enriched above natural, but less than 10 pct U ²³⁵ .	5 kg or more	Less than 5 kg but more than 1 kg. 10 kg or more	1 kg or less. Less than 10 kg. 10 kg or more.
3. Uranium-233	Unirradiated ^b	2 kg or more	Less than 2 kg but more than 500 g.	500 g or less.

^a All plutonium except that with isotopic concentration exceeding 80 pct in plutonium-238.

^b Material not irradiated in a reactor or material irradiated in a reactor but with a radiation level equal to or less than 100 rd/h at 1 m unshielded.

^c Natural uranium, depleted uranium, thorium and quantities of uranium enriched to less than 10% not falling into Category III should be protected in accordance with prudent management practice.

^d Discrete sources of radium-226 (Ra-226).